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Assessment on Hybrid E-Learning Instrument

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Abstrak

Kajian ini bertujuan untuk menambahbaik instrumen e-Pembelajaran Hibrid 9.3. Responden kajian terdiri daripada 233 orang pelajar Universiti Islam Antarabangsa Malaysia, Gombak yang mempunyai pengalaman dalam pengajaran dan pembelajaran secara hibrid. Model Pengukuran Rasch digunakan dalam kajian ini. Analisis kesahan yang dilaksanakan adalah (i) kesepadanan item, (ii) pemetaan item dan responden, (iii) penskalaan instrumen, dan (iv) unidimensi item. Hasil kajian menunjukkan (i) item yang dibangunkan sepadan dengan konstruk yang diwakilinya, (ii) item bertabur secara sekata pada bahagian min responden, (iii) skala instrumen perlu melalui penambahbaikkan, dan (iv) instrumen adalag multidimensi. Justeru, ini menunjukkan bahawa instrumen e-Pembelajaran Hibrid mempunyai item yang mengukur konstruk yang diwakili serta bersesuaian dengan kebolehan responden kajian.

Kata kunci: *Kesahan, Instrumen, e-Pembelajaran Hibrid, Model Pengukuran Rasch*

Abstract

This study aims to improve Hybrid e-Learning 9.3. A total of 233 students of International Islamic University Malaysia, Gombak who have the experience in hybrid teaching and learning were involved as respondents. Rasch Measurement Model was used for this study. Validity analyses conducted were on (i) items compatibility, (ii) items and respondents mapping, (iii) instruments scaling, and (iv) item dimensionality. The findings of the study show that (i) the items developed correspond with the construct they represent, (ii) items are evenly distributed on the mean of the respondents, (iii) the scale of instruments to be improved, and (iv) the instrument is multidimensional. Therefore, it shows that Hybrid e-Learning instrument has the items that measure the construct it represents as well as the compatibility with the capability of the respondents of the study.

Keywords: *Validity, Instrument, Hybrid e-Learning, Rasch Measurement Model*

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Introduction

The world of education has gone through a lot of changes. Such transition causes higher demand for graduates who have the knowledge, quality and various learning styles. Therefore information technology and communication (ICT) plays an important role in solving most of these problems. According to Palloff and Pratt (2000), many higher learning institutes have given good feedbacks on the application of ICT in education. In particular, e-learning applications have brought great changes to the students and educational institutions. This can be seen in the aspect of student-centered learning. Structured discussions may provide ample time and space to encourage the students to be open-minded and actively participate in discussions (De Wever 2009). Student-centered e-learning using problem-based learning can develop many skills such as teamwork, cooperation and unity (Neo 2005). In addition to that, the students are able to develop critical thinking skills through analysis, synthesis and reflect in solving unique problems. Therefore, Glud (2010) stated that the application of Web technology such as Web 3.0 in student-oriented learning is the focus of the latest trend of education in line with country's development towards 21st century.

E-Learning revolution that applies ICT plays an important role in producing students who are information literate and have the skills of the 21st century. The 21st century needs new innovation in education, especially in relation to teaching and learning process with the application of technology. This innovation can only be materialized with the cooperation from many parties especially the administration, academics and students. This is to create active learning. Educators have to vary their teaching techniques that cater to various needs and learning styles of the students in order to create active learning. The objectives of the change can be achieved in many ways and one of them is through the application of technology. The application and development of technology in education need a relevant pattern of assessment to be used in the teaching and learning (T&L) process to ensure all important elements of T&L are materialized. This study is conducted to obtain the validity of Hybrid e-Learning 9.3 instrument. Retesting of the items developed is important in ensuring its accuracy and sensitivity (Croker & Algina 1986; Muhammad Bashir 2008; Burton 2011).

Problem Statement

Education is one of the main factors in the development and improvement of human resources of a country. Now, the increasing economic competition has made education as an important field in contributing solutions towards the problem. Therefore, in order to ensure the effectiveness of education in assisting the national economy, educators have taken the steps to apply technology in teaching and learning. Information Technology and Communication (ICT) is one of the important aspects in ensuring sustainable growth of a developing country (Crede &Mansell 1998; Frais 2003). Integration of ICT in teaching and learning contributes in the improvement of skills and motivations among teachers and students (UNESCO 2011). According to Thioune (2003), the past two decades have seen many changes brought by ICT. ICT has brought a lot of prominent changes in various fields especially education. Therefore, in order to ensure the efficacy of integration of technology in education, suitable instrument is needed to get the feedback from the students on their perception and acceptance towards hybrid teaching and learning process. However, most of the instruments marketed are focused on Western hybrid teaching and learning process which is different that the hybrid teaching and learning process in higher education institutes in Malaysia.

In order to overcome this problem, Hybrid e-Learning 9.3 (Rosseni Din 2011) which consists of five constructs and 20 items in which each construct contains four items was developed. However, this instrument did not go through assessment of the items developed in terms of the compatibility of the items, mapping of items and respondents, instrument scaling and unidimentional items. These tests are important in ensuring the items developed are valid to be used and given to the respondents. Therefore, this study is conducting the validity test on the items of the instrument by using Rasch Measurement Model. Croker and Algina (1986), as well as other experts of measurement (Muhammad Bashir 2008; Burton 2011) emphasized on the importance of retesting the items developed in ensuring the accuracy and sensitivity. The implementation of this assessment is hopefully to assist in the improvement process for Hybrid e-Learning instrument, so that it can be used as a strategy in the integration of technology in teaching and learning to achieve the objectives.

Methodology

This study is using survey design by using the questionnaires distributed to the respondents. Respondents were chosen by using convenience sampling based on their experience in applying hybrid teaching and learning process. Since this study is using Rasch Measurement Model in measuring the

validity of the items, there are several matters that have to be considered in deciding the total number of respondents involved.

For Rasch Measurement Model, it is required to have symmetrically stable or balanced items measurement and respondents (Linacre 1994). The researchers are to expect slight changes each time calibration is done on a set of items on different individuals in the same population. Principally, the bigger the size of respondents, the lesser changes can be observed. Small number of respondents such as 4 or 5 people will produce a highly unstable result. However, if the number of respondents is too big such as 2000 to 3000 people, the result will be almost the same. Furthermore, big sampling requires higher cost and consumes longer time to be conducted. Therefore, 233 respondents were involved in this study to fulfill the needs to obtain good item calibration.

Findings

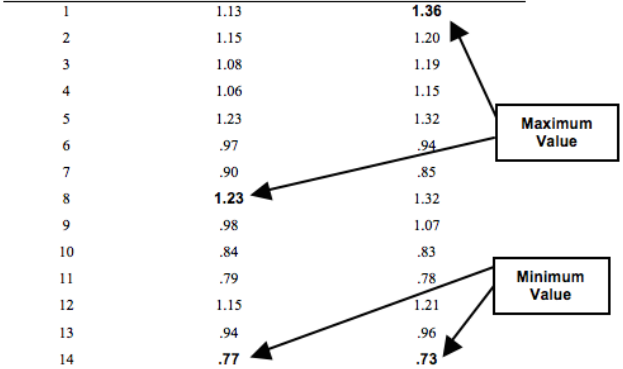
This section will explain the findings obtained in this study. The findings are divided into four parts. The first part is related to the compatibility of the item, second part is on the mapping of items and respondents, the third part is on instrument scaling, meanwhile, the last past is on items dimensionality.

Item Compatibility

Referring to the Table 1, it is shown that the minimum value of *infit MNSQ* is .77, meanwhile the maximum value is 1.23. The minimum and maximum values obtained are still within the range of productive item compatibility which is ranging from .5 to 1.5 (Linacre 2007). Besides that, the minimum value computed for *outfit MNSQ* of this study is .73, meanwhile the maximum value is 1.36. This shows that there is no non-compatible item in the instrument because the values obtained are within the range of .5 and 1.5 (Linacre 2007). Thus, it can be concluded that the items developed measures the construct that they represent. Items 1 to 4 represent Content construct, items 5 to 8 represent Delivery construct, items 9 to 12 represent Outcome construct, items 13 to 16 represent Interactive construct, and items 17 to 20 represents Structure construct.

Table 1. Item Compatibility

Item	*Infit MNSQ*	*Outfit MNSQ*
1	1.13	**1.36**
2	1.15	1.20
3	1.08	1.19
4	1.06	1.15
5	1.23	1.32
6	.97	.94
7	.90	.85
8	**1.23**	1.32
9	.98	1.07
10	.84	.83
11	.79	.78
12	1.15	1.21
13	.94	.96
14	**.77**	**.73**
15	.90	.89
16	.88	.82
17	1.05	1.04
18	1.07	1.07
19	.86	.85
20	.98	.98



Instrument Scaling

The Figure 2 shows the Category Probability Curve of a five-scaled instrument of the study. X-axis represents the measured matter which is hybrid T&L, meanwhile Y-axis represents the probability of chosen responses based on scale one to five. According to Linacre (2004), the average of the observation measured should increase consistently as the scale increases.

The five categories are Strongly Disagree, Disagree, Undecided, Agree and Strongly Agree. Category 1 represents “Strongly Disagree” increases as the T&L level increases. However, in Category

3 which is “Undecided” shows decreasing curve as the scale increases. Besides that, it is also shown that the threshold for Category 3 is smaller than other categories. Linacre (1999a) stated that the threshold should increase at least 1.4 logit to show the differences between categories, but should not exceed 5 logit. Based on the figure below, it shows the usage of the third category as less suitable to be used as the threshold is 0.8 logit which is lesser than 1.4 logit as mentioned by Linacre (1999).

Thus, elimination of Category 3 should be done to see whether the process helps in improving the functional measurement scale tested. If the category is not removed, the measurement of other categories will be affected (Bradley 2011). Therefore, the elimination of the middle category which is Category 3 is optimum from the assessment view of this analysis. Due to that, the scaling of instrument for this study has to go for a review to ensure the scale used is suitable to obtain significant results.

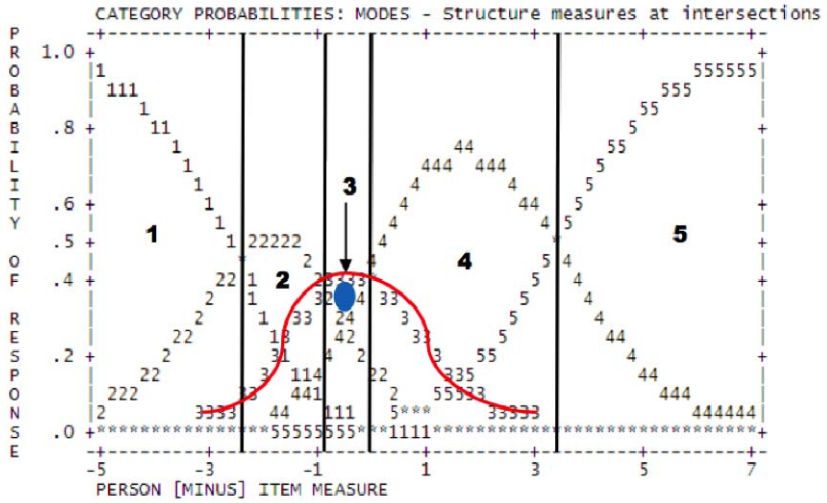


Figure 2. Category Probability Curve

Item Dimensionality

The Figure 3 shows the Hybrid e-Learning 9.3 instrument dimensionality analysis based on Rasch Measurement Model. Linacre (2007) stated that the variance value explained by raw variance explained by measures to be preferably more than 60% or more than 30%, meanwhile the value of unexplained variance explained by 1st contrast is less than 3 and 5% are the benchmarks to show that the items are unidimensional. The figure below shows raw variance explained by measures obtained is 51.0% which greater than 30%, meanwhile the value of unexplained variance explained by 1st contrast is 2.6 which is smaller than3. However, the unexplained variance explained by 1st contrast computed is 6.3% which is greater than 5%.Based on the result of the analysis, it can be concluded that the measurement on Hybrid e-Learning constructs did not clearly show the presence of second dimension. This finding shows that the instrument is multidimensional and consists of five factors which are Content, Delivery, Outcome, Interactive and Structure.

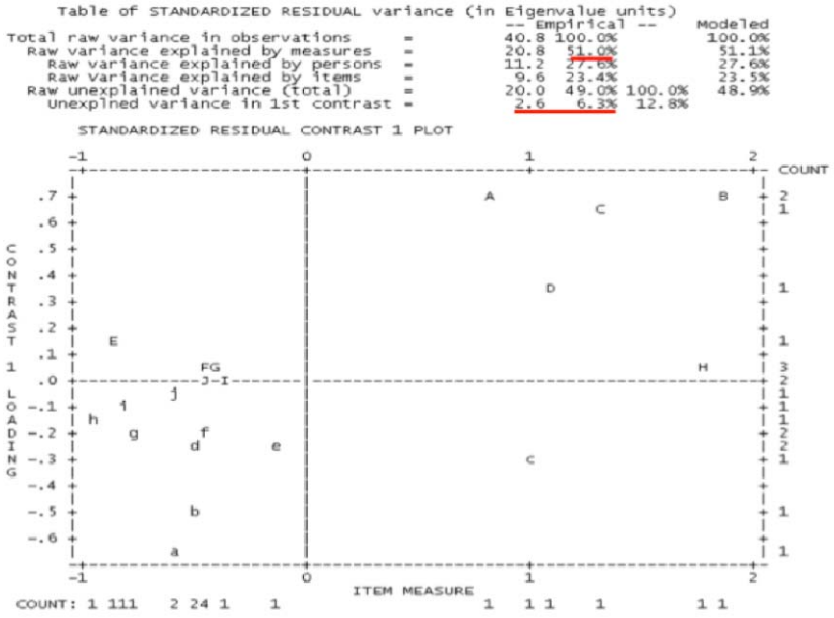


Figure 3. Item Dimensionality

Discussion and Conclusions

This study explored the psychometric characteristics of Hybrid e-Learning 9.3 instrument and confirms that the instrument is able to measure hybrid T&L based on the definition and model developed. Others study, have developed Hybrid e-Learning instrument for Higher Education students yet reported the scaling of the instruments, instruments dimensionality and the process of validation by using Rasch model. Therefore, this study shows several steps conducted by using Rasch Measurement Model in validating the instrument. Instrument validation with good psychometric characteristics enables the validation to be done smoothly. The findings show that Hybrid e-Learning 9.3 developed is consisting of items that can measure the constructs that they represent, and are suitable with the capability level of the respondents. Besides that, this instrument is multidimensional and is consisting of five factors which are Content, Delivery, Outcome, Interactive and Structure. However, the scaling of the instrument has to be reviewed because the third category which is "Undecided" is seen as unsuitable to be placed as one of the scales for this instrument. Therefore, future researches should be focusing on replicating the findings obtained in this study. This is to develop a stable and highly validated Hybrid e-Learning.

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